must reduce still further the limits within which the individual worker can hope to make substantial contributions to the knowledge of his subject. The danger to be guarded against is the unhealthy development of the effects of specialisation. Although it may no longer be possible to obtain a comprehensive grasp of a whole group of sciences, there still remains the lesson conveyed to the scientific world by Charles Darwin's work—that extreme concentration upon one particular investigation need not produce mental atrophy in other directions. There may be a narrowness of outlook produced by extreme specialisation which, if not guarded against, may easily pass from mere narrowness to actual illiberality of mind. This in its way is quite as unscientific, as it is certainly more dangerous in its immediate effect upon our younger contemporaries, as the shallowness arising from too great a diffusiveness.

R. MELDOLA.

ALPINE HYDROLOGY.

Service d'Études des grandes Forces hydrauliques (Région des Alpes.) Tome iii. Résultats des Etudes et Travaux au 31 Décembre, 1907. Pp. 688; with maps, photographs, and diagrams. (French Ministry of Agriculture, 1908.)

IN May of last year (vol. lxxviii., No. 2010) there were reviewed in these columns two volumes rendering an account of the initiation of a hydrological service in France, formed for the purpose of studying the rivers and watercourses of that country, which were capable of developing power for, and otherwise benefitting, industrial and agricultural pursuits. The purview of the inquiry was to be restricted, in the first instance, to the region of the Alps, to be extended later to the Pyrenees, and ultimately, no doubt, to include the Vosges and the hilly districts of the north and west. At the time of the issue of the volumes in question, the results of these investigations were only forthcoming in systematised form so far as the close of the year 1905, and operations had been confined to a certain portion of the Alpine watershed, the work being carried out under the supervision of two engineers, MM. de la Brosse and Tavernier, the former of whom reported on the basins of the Arve and the Isère, and the latter on the regions of the Durance and the Var.

The book before us is the third volume of the series, and it forms a compendium of figures and statistics no less impressive than its predecessors. It continues the account of the studies prosecuted by M. de la Brosse during the years 1906 and 1907. These relate to the northern district of the Alps, included between the bed of the Rhone and the Italian frontier on the one part, the Lake of Geneva and the basin of the Durance on the other part.

The southern district, from the basin of the Durance to the Mediterranean littoral, under the direction of M. Tavernier, is to form the subject of a subsequent volume.

M. de la Brosse commences his report with an enumeration of the gauging stations within his district of 26,000 square kilometres (10,000 square miles), showing that they have increased in number from 30 in 1903 to 60 in 1905, and to 100 at the present time. The number of separate gaugings taken in 1907 was more than a thousand. Nearly all the stations, he remarks, are of the foot-bridge type, the exceptions being in watercourses of considerable width, where barges were employed, and in places of considerable difficulty of access, where the only available method was to employ a skiff suspended from a cable fixed at some suitable level. The footbridge, from its greater security and convenience, proved by far the best system, and a number of interesting photographs show the variations in design at different stations to meet local peculiarities.

The instruments used for gauging were described in some detail in the first volume, and the only comments now made in connection with them, after some experience of their working, relate to a few trifling modifications and minor improvements in design. A calibrating station for testing current-meters was established at Grenoble in 1906, and this has been found a considerable convenience, as, prior thereto, the instruments had to be dispatched to the hydrotechnical laboratories of Berne or Munich.

The station in question comprises an electrical apparatus, mounted on a framed platform, set in a quiescent sheet of water forming part of a fortification moat. The apparatus is actuated by a triphase motor of 5 horse-power, which enables various degrees of speed to be imparted to a movable arm carrying the instrument to be tested, ranging from a few centimetres to nearly 5 metres (say, an inch to 16 feet) per second. By a circuit connection the number of revolutions of the screw is signalled at periods of from 25 to 50, and a simple calculation therefrom determines the relative speed in a moving medium. The process requires the services of two operators and two assistants, lasts from one to two hours, and (including the cost of the electric current) involves an expense of 1*l.* per instrument dealt with.

During the two years 1906–7, surveys have been made of the basins of the Dranses, the Usses, the Fier, the lake of Bourget, the Guiers, the Bourbre, the Gère, the Collières, the Galaure, the Drôme, the Roubion, the Lez, and the Eygues, all tributaries of the Rhone, and comprising an area of 918,643 hectares (2,300,000 acres). These basins are all separately delineated in the volume under review in a series of charts to a scale of 1/200,000, which are accompanied by tables recording various analytical particulars of the component sections, according to superficies and altitude.

A noteworthy feature of several of the smaller basins (especially that of the Collières) is the disappearance and reappearance of streams in and from subterranean passages, resulting oftentimes in several changes of name for a single watercourse, the identity of which can be established without serious difficulty throughout its apparently disconnected track. For example, the same waters feed successively the Reval, the Orou, and the Collières, which thus constitute really a single stream.

An interesting extension of these topographical investigations has been made in reference to some of

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the principal glaciers, which the commission rightly regard as important reservoirs. The glaciers of Vallouise were surveyed in 1904, those of the Grandes Rousses in 1905, and the glacier of Mont de Lans in 1906–7.

It would be impossible within the limits of a short article to touch upon all the points of interest in M. de la Brosse's report, and the foregoing constitute simply a few random notes culled from pages which are replete with valuable information on all branches of hydrographical research amid the Alps. Mention must, however, be made of two supplementary notes by M. Mougnié, of Moutiers, the first on the subject of controlling the discharges of the Isere, and the second on variations in the bed of the same river. Then follows the second part of the volume, a compendium of more than 600 pages of tabulated data covering the whole area of operations.

The admirable manner in which these observations are being made and recorded reflects the highest credit on the Direction de l'Hydraulique, and abundantly justifies its formation and support. It is evident that there is being collected a wealth of data which must prove of incalculable value in estimating the hydrological resources of the country and in utilising them to the best advantage and to their fullest extent. Further volumes of the series will be awaited with undiminished interest by all who are concerned in any way in the development of hydrotechnical studies.

B. C.

THE SCIENCE OF PATHOLOGY.

The Principles of Pathology. By Prof. J. George Adami, F.R.S. Vol. I., General Pathology. Pp. 948. (London: Henry Frowde and Hodder and Stoughton, 1909.) Price 30*s*. net.

WE congratulate Prof. Adami on the completion of this exhaustive work, of nearly 1000 pages, on general pathology, more particularly as he had the misfortune to lose his library, the manuscript of the concluding chapters, and the illustrations collected over a period of many years for the purposes of the book, in the fire by which the medical buildings of McGill University were destroyed in April, 1907.

The book is divided into three sections, section i. dealing with prolegomena, and in particular with the cell and its relation to disease, section ii. with the causes of disease, and section iii. with the general morbid and reactive processes.

In the opening chapters an excellent summary is presented to the reader of the various theories of cell structure and connections, and of the physiology and chemistry of the cell, including enzymes and their mode of action. In these considerations the author adapts the "side-chain theory" to explain the relationship of the protein molecule to life and metabolism and to enzyme action. Whether correct or no, this conception has the advantage of visualising the subject, and gives the student concrete ideas which he can grasp, in place of abstract ones.

Growth, states of cell activity, cell multiplication, adaptation, and differentiation are next considered, and the important subject of inheritance has, rightly, considerable space devoted to it; and Mendel's and Galton's laws, mutations, and the inheritance of acquired characters all receive adequate treatment.

Having thus cleared the ground by a consideration of these general biological problems, the author passes on to the subject-matter proper, commencing with a discussion of the causes of disease, in which inheritance is again considered, and the various anomalies of development and the monstrosities are very fully described. The bacterial, protozoan, and metazoan parasites are then discussed, but only in a general way, as causes of disease—a wise limitation, as the parasites themselves and their general biology and activities are fully described in various other textbooks. Referring to the presence of bacteria potentially pathogenic in and upon the healthy body, the author mentions that streptococci are present in the mouth in 80 per cent. of healthy people, but it is to be noted that Gordon has shown that the species present in the mouth, and so abundant there, is non-pathogenic, and differs from the disease-producing streptococci.

In the section on malaria it would have been more correct to speak of "anopheline" rather than "anopheles," mosquitoes as agents of transmission.

Chapter xi. is devoted to endogenous intoxications due to abnormalities of internal secretion (*e.g.* of the thyroid, adrenals, pancreas, &c.), which, it is true, gives the essentials of the subject, but fourteen pages seem to us inadequate space in a work of this kind to discuss so important a subject.

In the section on the morbid and reactive processes, the local and systemic reaction to injury and inflammation are dealt with very fully, and altogether in a judicious and instructive manner. Immunity and its various problems are similarly well treated, and a survey is given of every branch of the subject; Ehrlich's "side-chain theory" in particular is well described, and at some length. As regards anaphylaxis—the *increased* susceptibility conferred by an injection of blood-serum—we cannot help thinking that the suggested explanation is laboured, and, involving as it does the ionic hypothesis, beyond our present knowledge of the phenomenon.

The progressive tissue changes—hypertrophy, regeneration, and new growths—are next discussed in a very complete manner. We are glad to note that the author emphasises the futility of attempting to graft the tissues of lower animals on man for purposes of repair.

In speaking of placental moles, the inexact, if not incorrect, appellation "hydatid" is retained; "hydatidiform" is preferable.

The characters of neoplasms (tumours or new-growths) are given at considerable length. The classification of neoplasms adopted is the histogenetic one supported by the author. A principal objection urged by Prof. Adami against the embryogenetic classification is that it separates new growths histologically similar, *e.g.* glioma of epiblastic, and sarcoma of mesoblastic, origin. We venture to think that too much stress should not be laid on this argument, for even now the minuter structure of new growths is only beginning to be studied. Nor are we

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